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10/528,868	10/13/2005	Hans-Joachim Mussig	536-009.21	6207

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EXAMINER	
KALAM, ABUL	
ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/528,868	MUSSIG ET AL.	
	Examiner	Art Unit	
	Abul Kalam	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 June 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) *10-21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 July 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. With respect to the restriction requirement, Applicant's arguments are not persuasive. The introduction to chapter 800 states:

> "This chapter is limited to a discussion of the subject of restriction and double patenting under Title 35 of the United States Code and Title 37 of the Code of Federal Regulations as it relates to national applications filed under 35 U.S.C. 111(a). The discussion of **unity of invention** under the Patent Cooperation Treaty Articles and Rules as it is applied as an International Searching Authority, International Preliminary Examining Authority, and in **applications entering the National Stage under 35 U.S.C. 371 as a Designated or Elected Office in the U.S. Patent and Trademark Office is covered in Chapter 1800**."

Thus, Applicant's arguments, relating to section 806.05(f), are not relevant to the restriction requirement because the instant Application is entering the National Stage under 35 U.S.C. 371. Furthermore, even though the claims were amended after the restriction requirement mailed on October 11, 2006, the restriction is still proper because:

The application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

Group I, claim(s) 1-9, drawn to device.

Group II, claim(s) 10-19, drawn to method.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the device of claim 1 does not require that a mixed oxide layer is deposited prior to depositing a praseodymium oxide layer. Furthermore, note that the method of claim 10 does not require that a mixed oxide layer is arranged between the silicon-bearing layer and the praseodymium oxide layer.

Furthermore, this application contains claims 10-21, drawn to an invention nonelected with traverse in the reply filed on November 6, 2006. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Claim Objections

2. Claims 2-7 are objected to because of the following:

In line 1 of claims 2-7, the limitation "a semiconductor component" should be amended to recite --The semiconductor component--, because the semiconductor component in claims 2-7 refers to "a semiconductor component," recited in claim 1.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 4 is rejected as failing to define the invention in the manner required by 35 U.S.C. 112, second paragraph.

The claim is narrative in form and replete with indefinite and functional or operational language. The structure which goes to make up the device must be clearly and positively specified. The structure must be organized and correlated in such a manner as to present a complete operative device. The claim must be in one sentence form only.

In lines 7-10 of claim 4, a second sentence has been added to claim 4. The claim structure is incorrect because, as stated above, a claim must be in one sentence form only. Also, the entire second sentence of claim 4 should be underlined, since these new limitations are an amendment to the previously recited claim 4. Thereby, for examination purposes, the limitations in the second sentence of claim 4, will be interpreted as a typographical error, and thus ignored.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. **Claims 1-3 and 5-9** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Yu et al. (US 2002/0089023; previously cited, hereinafter Yu)**.

Regarding **claim 1**, Yu discloses in **Fig. 3**, a semiconductor component having a silicon-bearing layer **(301)** and a praseodymium oxide layer **(306)** characterized in that arranged between the silicon-bearing layer **(301)** and the praseodymium oxide layer **(305)** is a mixed oxide layer containing silicon, praseodymium and oxygen **(¶ [0037], [0039] and [0042])**.

Yu does not disclose wherein the mixed oxide layer has a thickness of less than 5 nanometers. However, the range would have been obvious to an ordinary skilled in the art because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955).

Regarding **claim 2**, Yu does not disclose wherein the oxide layer has a thickness of a maximum of 3 nanometers. However, the range would have been obvious to an ordinary skilled in the art because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955).

Regarding **claim 3**, Yu discloses wherein the mixed oxide **(305)** is a non-stoichiometric silicate **(¶ [0039])**.

Regarding **claims 5 and 6**, Yu discloses wherein the silicon-bearing layer **(301)** comprises silicon-germanium or silicon, respectively **(¶ [0037])**.

Regarding **claim 7**, Yu discloses wherein silicon-germanium layer or the silicon layer [301] has an (001) orientation at the interface to the mixed oxide layer **(the (001) orientation refers to flat surface, in Fig. 3 it shows that interface of 301 and 305 is flat)**.

Regarding **claim 8**, Yu discloses in **Fig. 3**, a MOSFET as set forth in claim 1.

Regarding **claim 9**, Yu discloses a memory cell **(¶ [0002])** as set forth in claim 1.

6. **Claim 4** (as best understood by the Office) is rejected under 35 U.S.C. 103(a) as being unpatentable over **Yu ('023; presented above)** in view of **Ahn et al. (US 2003/0228747; cited by Applicant, hereinafter Ahn)**.

With respect to **claim 4, Yu** teaches all the limitations of the claim with the exception of explicitly disclosing: wherein mixed oxide layer is a an alloy of the type $(Pr_2O_3)_x(SiO_2)_{1-x}$, wherein x increases from a first value, at an interface of the mixed oxide layer with the silicon-bearing layer, to a second value, at an interface of the mixed oxide layer with the praseodymium oxide layer

However, **Ahn** discloses an analogous semiconductor component wherein the mixed oxide layer **("interfacial layer," ¶[0040]-[0042])** is a an alloy of the type $(Pr_2O_3)_x(SiO_2)_{1-x}$ **(¶[0042])**, and wherein x increases from a first value, at an interface of the mixed oxide layer **("interfacial layer")** with the silicon-bearing layer **("silicon based substrate," ¶[0041])**, to a second value, at an interface of the mixed oxide layer with the praseodymium oxide layer **("Pr_2O_3," ¶[0041]) (it is implicit that the**

percentage of praseodymium oxide, in the mixed oxide layer, increases as the thickness of the mixed oxide layer increases).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teaching of **Ahn**, with the device of **Yu**, in order to form the mixed oxide layer with an alloy of $(Pr_2O_3)_x(SiO_2)_{1-x}$, for the purpose of providing the desired, effective dielectric constant for the gate dielectric **(¶ [0042])**.

Response to Arguments

7. Applicant's arguments filed June 11, 2007, have been fully considered but they are not persuasive.

With respect to claim 1, Applicant argues that Yu does not disclose that the template layer 305 includes praseodymium. The argument is not persuasive because Yu states that the template layer **305** may include 1-10 monolayers of silicon, oxygen, **and an element suitable** to successfully grow layer **306 (¶ [0039])**. Furthermore, Yu teaches wherein layer **306** may include praseodymium and oxygen **(¶ [0041]-[0042])**. Thus, it is obvious that the "element suitable" to successfully grow a layer **306** of $\mathbf{PrO_{2-x}N_x}$ **(¶ [0042])** is praseodymium. Applicant argues that praseodymium is not needed to grow a layer of praseodymium oxide because prior art teaches growing praseodymium oxide on a silicon oxide layer. The argument is not persuasive because Yu clearly states that layer **305** contains "silicon, oxygen, **and** an element suitable to grow layer **306**," and furthermore provides an example of $\mathbf{SrTiO_{3-x}N_x}$ as layer **306** and **Si-O-Sr or**

Si-O-N-Sr as layer **30 (¶ [0039])**. Thus, it is obvious that for a layer **306** of **$PrO_{2-x}N_x$**, the template layer **305** will comprise **Si-O-Pr or Si-O-N-Pr**.

With respect to claim 1, Applicant also argues that layer **306** of Yu is a praseodymium "oxide-nitride" layer and thus is materially different from praseodymium oxide. The argument is not persuasive because the recitation of "praseodymium oxide layer," does not exclude the layer from having nitrogen. Note that the term "having" is similar to the term "comprising," in that the terms do not exclude the presence of other elements. It has been held that the use of the term "comprising" leaves a claim open for inclusion of material or steps other than recited in the claims. Ex parte Davis, 80 USPQ 448 (PTO Bd. App. 1948). Use of the term comprising does not exclude the presence of other elements. In re Hunter, 288 F. 2d 930, 129 USPQ 25 (CCPA 1961).

Conclusion

8. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Abul Kalam whose telephone number is 571-272-8346. The examiner can normally be reached on Monday - Friday, 9 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. K./

/Thao X Le/
Primary Examiner, Art Unit 2814